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## Underwater Warhead Technologies

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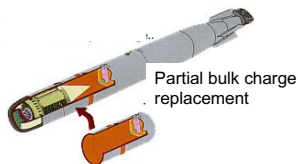
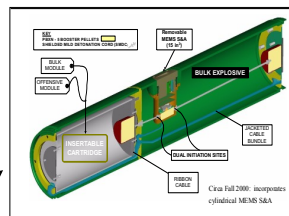
# Underwater Warhead Technologies

## Sea Shield: Neutralization of Littoral Open Ocean Submarine Threats

### Concept for Expanding ATT Capabilities



Model of Baseline Quick Reaction  
6.75 ATT Defensive Torpedo



Partial bulk charge  
replacement



Experimental Model

### Operational Payoff/Transition Targets:

- Detonation merging shown to increase explosive power by ~100%, allowing the use of high bubble energy explosives for dual directed energy and blast effects. Feasibility of reactive material jet/penetrators shown. Results directly applicable to ATT: Add-on low-cost shaped charge offensive capability.
- Transition team: NAVSEA PM404, NSWC-Indian Head, APL Penn State.

**Deliverables:** Reports, software, processes

### Technical Objective

Demonstrate affordable warhead concepts for the family of next generation of torpedo systems.

### Technology Challenges

Agile precision strike and complex nature of the threat requires enhanced performance at reduced warhead size.

### Technical Approaches:

Novel means for amplifying explosive power and incorporating reactive materials for improving shaped charge performance, and enhancing the directionality of underwater blasts. Optimizations for systems applications continuing with planned demonstrations.

### Cost and Schedule of Major Team Follow-ons:

#### **6.2 Experimental Demonstrations:**

Enhanced Blast	2005-6	\$100K
Hi-Energy HE Ampl	2005-7	\$250K
Reactive Jetting	2006-8	\$500K

#### **6.3b/6.4 ATT Offensive Module Development :**

ATD	2008-9	\$3M
EMD	2010-12	\$15M

### Student Involvement:

- T-C. Phua (12/02)
- T. Moore (03/03)
- A. Biesterveld (06/04)
- M. Kulawiak (06/04)
- L. Glosby (12/04)

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